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What Is Production?

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INTRODUCTORY

EARLY in the following pages we shall answer the above question by saying that production consists essentially of so changing matter in composition, in form and size, in place, in time and in possession as to render it capable of satisfying the wants of the persons who eventually use it; or, as the economist would put it, production consists in the creation of utility—of form, place, time and possession utilities. Were we to stop there, however, we should say little that is of value. Therefore, we have conducted the analysis and discussion that lead up to this first conclusion in such manner as to lay the foundation of and lead on to a more important result, namely, a statement of what is society's production problem—the economic problem. From the brief discussion of the characteristics of our wants, on the one hand, particularly the fact that practically they are capable of unlimited expansion in variety and extent, and, on the other hand, of the quite limited extent of our available resources in space, time, materials, equipment and energy, we see that society's production problem is to put such space, time, materials, equipment and energy as are available to the most important uses and to the most effective use.

The purpose of all production is to furnish goods with which to satisfy our wants. Except for the fact that we all have wants, and many of them, which can be satisfied only by applying certain concrete material articles, there would be no necessity, no motive for producing these articles, and no indus-

trial activity. To understand what production is, therefore, we must start with a brief consideration of our wants.

WANTS—THE CAUSE OF PRODUCTION

Many wants have their origin in needs. In our bodily activity we burn fuel in the muscles, and break down tissues. If our bodily activity is to continue for long, these tissues must be rebuilt, this fuel replenished, energy must be restored in our muscles. There is need for replenishing material. Corresponding to this is the sensation of hunger and the want for foods containing certain organic compounds. Without protection, our body temperature would be too much lowered, our bodies would be subjected to many injuries. There is need for bodily protection; corresponding to this is a want for clothes, shoes, etc. Whether all wants originate in needs will be left to the psychological economist.

Each specific want is capable of complete satisfaction during any given short period. We become hungry; we are fed; and the want for food is entirely removed for the time being. It is so with any other specific want that we feel at any particular moment.

But most wants reappear at more or less periodic intervals. We satisfy our hunger in the morning, only to have the job to do over again at noon, and again in the evening, day after day. We hear enough of a certain song or other musical selection on one day only to be delighted with it on a later occasion. The recurrence of wants at more or less regular intervals is a familiar and important feature of them.

While any given want is capable of complete satisfaction during any given period of time, and is therefore limited in extent, the number and variety in the kind of wants we are capable of feeling seems capable of indefinite expansion—unlimited. We have all had the experience of wanting some one thing—a pair of skates, a bicycle, a piano, an automobile—so much that we were not aware that there was anything else in the world worth while. If we could only obtain that one thing we should be supremely happy and content. However, soon after getting it—after the novelty had worn off—we discovered that there were other things we wanted. Less important wants make themselves felt as soon as the more urgent wants are provided for. We are never satisfied, no matter how much we have.

If the process of satisfying a want did not take time, therefore, our ability to consume goods would be indefinitely great. There would be no limit to it. With most wants, however, the process of satisfying them does take time. Eating takes time. We can wear only one pair of shoes, one set of clothing at a time. For this reason the number of wants we can satisfy during any given period of time, even though we have ample means, is limited.

It is true that we can eat food and wear shoes and clothes, enjoy beautiful flowers, elegant furniture and a conversation or an orchestra selection at the same time. It is true that we can furnish our bodies with the kind of material needed, appeal to the gustatory sense and to the aesthetic sense—in tasty serving—all in the one article. The same article may be both a musical instrument and an elegant piece of furniture. And the tendency in all production is so to prepare each article that it will minister to the satisfaction of more than one kind of want. Never-

theless, our ability to do this is limited, and the number and variety of wants we can simultaneously attend to and satisfy is probably limited. But the limit is an elastic one. And few of us have ever attained it or had the means of attaining it.

Most wants can be satisfied only by applying certain concrete material things. Our hunger can be satisfied only by our consuming certain specific foods. Protection against the elements is afforded only by our wearing shoes and various articles of clothing, living in houses, etc. There are certain apparent exceptions; for example, our desire to hear Caruso and a supporting troupe sing Pagliacci; but to gratify this we must provide the hall, the orchestra instruments, yes—and even Caruso and his troupe.

These concrete material things—called “commodities,” articles of “wealth,” “economic goods” or simply “goods”—do not exist or come into existence spontaneously as needed or desired. They do not spring into existence automatically in response to the want. They must be “produced.”

PRODUCTION UTILITIES

The materials exist somewhere, but in disassembled form. They must be assembled into the combinations that are capable of satisfying these wants. In agriculture, horticulture and other extractive industries certain plants, animals, etc., are grown to build up the needed organic compounds. Even certain chemical manufacturing industries do the same thing; synthetic dyes are made; the druggist compounds various drugs in certain proportions in filling a prescription. The materials must also be put into the right size and shape for satisfying wants. The wood must be converted into a chair, table, flagpole; the steel and bone into a pen-knife; the wool into suits of clothes;

the kernel of the palm nut into buttons and so on. This work is said to create *form utility*.

Oranges in California, collars in Troy, N. Y., pen-knives in Sheffield, England, cameras in Rochester, N. Y., are of no use to me in Chicago. They must be transported to the places occupied by the persons who want them. Transportation whether long or short, is said to create *place utility*.

Potatoes harvested in September and October will be of no use for satisfying hunger in January or May, cotton gathered in December will be of no avail for making clothing in March or June, unless preserved in the meantime.

They must be stored until the time at which they are wanted. Storage is said to create *time utility*.

Finally, in order that the orange, the pair of shoes, the house, the motor boat may satisfy my wants, I must have possession of them so that I can apply them; I can eat the first, put on the second, get into the third or fourth. Giving me this possession by sale, lease or otherwise is said to create *possession utility*.

Form utility, place utility, time utility, possession utility are not really different utilities. They are merely successive phases of the whole process of providing me with an article that is capable of satisfying one of my wants.

In its broader sense, production consists of all those activities the purpose of which is to combine the chemical elements into the right combinations or substances; to convert these into the right forms and sizes and put them into packages that preserve them and are convenient for handling; to transport these goods to the places where needed; to preserve them until the time of need; and to deliver them to the persons who want them. Production consists of all those activities that

create *form utilities*, *place utilities*, *time utilities*, and *possession utilities*.

DIRECT AND INDIRECT PRODUCTION

In every day language, however, we probably confine the meaning of the term production largely to the first case. We ordinarily think of the farmers, the miners, the fishers, the manufacturers, as producing. We do not ordinarily think of the railroad, the warehouse and particularly the wholesaler and retailer as producing. Yet, since in our modern economic organization, each performs a necessary service—constitutes a necessary link in the process chain by which we are provided with want-satisfying goods—it is difficult to see where a logical distinction can be made.

In the production process energy is applied to materials. Animal or mechanical energy is applied in moving the plow through or the harrow over the ground, in moving the seed into the ground, in gathering the crop. Human, animal or mechanical energy is applied in the factory in removing the seed from the cotton, in spinning the cotton into yarn, weaving it into cloth or knitting it into garments; in feeding wheat through a mill and grinding it and separating it into flour, bran, middlings and shorts; in mixing flour and other materials, making them up into loaves, cakes, and so on and baking them; in transporting these things from place to place; in building the warehouses and other places in which materials are stored. All changes of form and place are accomplished only by applying energy to materials.

This energy may be that stored up in the muscles of human beings, in the muscles of animals. It may be applied through simple tools such as the axe, the hammer, the saw, the sled or wagon, or through more complicated transmitting mechanism—machines—such

as the treadmill, the sewing machine; or it may be the energy stored up in wood, peat, coal, petroleum, or the waterfall and applied through complicated machines. In olden days it was mostly animal and human energy. The progress of scientific discovery, invention and the industrial arts has more and more substituted mechanical for human and animal energy as the driving force in industry.

Nature is applying energy to materials in all her processes. Sunlight and heat are forms of energy that apply themselves to the elements of the soil and air and cause plant life to grow and store up energy. Sunheat falls upon the surface waters and stores up the energy in the clouds. This is released in the rain, which wears away the earth's surface, forms into streams and wears creases in the earth's surface, creates waterfalls, wears away the rock and carries away surface material and deposits it in new places, sometimes enriching the soil, as in the overflows of the Nile and the Mississippi, sometimes carrying the material out to sea. Water sinking into the earth's interior in obedience to gravity takes up heat energy from the interior, dissolves minerals along its course, and coming into fissures near the surface where the energy is released, deposits gold, iron, lead and so on.

But left to herself, little of nature's work would result in articles capable of satisfying men's wants. So far as our purposes are concerned, nature's combinations are haphazard. Production involves one other important element. This is intelligent planning and direction. The application of energy to materials must be planned and directed if want-satisfying goods are to be produced in any but meagre amounts. Intelligence must anticipate that certain wants will be felt during the next season, or year or decade or generation,

must decide which ones to provide for and what proportions, must choose the materials, plan the processes—the application of energy,—indeed, in the performance of each process must plan the application of the energy and direct it.

This planning and direction, always an indispensable function in connection with each process, is coming more and more to be the main function of the human factor in industry, and the application of muscular energy in the processes is becoming more and more a mere incidental function, such as pushing and pulling levers, pushing buttons to start and stop machines, guiding materials, etc.

Production is carried on then by intelligently planned and directed application of energy to materials. But our productive capacity is limited. It is limited because our productive resources—our available materials, our available energy, our available directing intelligence—are limited.

There may be unlimited material in the universe. We, however, are on the surface of the earth. Our material is limited to the stock that we have already accumulated and to that which we have made accessible by bringing the earth's surface under cultivation, by opening up mineral resources, etc. As time passes we shall make more available by subduing more of the earth's surface, discovering and opening up more mineral deposits, but even the whole earthly supply is limited were it all available.

There may be unlimited energy in the universe. But only that which is available here on the earth's crust is of any use to us in production. And this, during any specific day, week, month, year, is a definitely limited quantity. It is limited to the solar heat and light that falls upon our agricultural areas, to the wind that strikes our sails and

windmills, to the water power that we have harnessed, to the wood, peat and coal that we have already delivered to our power plants or that we shall deliver in the ordinary course of events, to the natural gas passing through our pipes. It is further limited by the amount and kind of facilities that we have already accumulated—the power plants, the machines that we have already created and set up—for its application in productive work. As time goes on and we continue to apply a portion of this available energy and these available materials to the production of more of such machines, such power plants, to the harnessing of more waterpower, and so on—as society continues to save—we shall increase the amount of materials and energy available for future productive purposes. As scientific discovery and invention proceed we shall obtain command over more forms of energy and a greater fund (or flow) of it, and shall have more effective means of applying it. But even then we shall not have actual command of an unlimited supply of energy or materials. It will simply be a greater amount than is now at our command.

Here we encounter the economic dilemma. Our capacity to produce goods is limited. Our capacity to feel wants, our capacity to consume goods is very large—so large as to entirely outrun our capacity to provide for them—practically unlimited.

The economic consequences are very important and far reaching. We cannot have enough to satisfy all wants. No matter whether the products of industry are equally or unequally divided, no matter whether we have private competitive, private monopolistic or socialistic industry, we cannot produce enough to satisfy all the wants of all the people. Therefore we have two important problems:

The first problem is to so divide our available productive resources among the various lines of production as to provide for the various wants in proper proportion—so as not to provide for unimportant wants at the expense of more important ones; not to provide for any want, relatively important or unimportant, beyond the point at which it becomes less important than is some other want to the provision of which available resources could be diverted. Imagine a starving man spending his money on a theatrical performance instead of food. Picture the feelings of the tired, not-too-well nourished, clothed and housed pedestrian multitude when they see a pampered, beribboned poodle taking an airing in a passing Pierce-Arrow.

Any person's capacity for consuming any one specific kind of article is limited. My capacity for consuming potatoes is narrowly limited. The capacity of the whole population to consume the one specific kind of article is similarly limited. And, indeed, long before its limit is reached the question will arise whether something else is not more desirable. Consequently, it is possible to have over production of one kind of article, or of a few kinds. Over production really means that the proportions in which the various articles are produced are not the same as the proportions in which they are valued and demanded. Those produced in greater proportion to others than is demanded are over produced; the prices they can command do not make their production profitable. But at the same time other commodities, by virtue of that very fact, are "under-produced"; their prices make their production unusually profitable. While thus there can be (relative) over production in a few lines, there cannot be a general over production of all commodities. Consequently, if our pro-

ductive resources are properly apportioned among all lines of production there is demand for every resource, every ounce or hour of labor. It is not true, therefore, that there is only a limited amount of work to be done. There is practically no limit to the demand for labor. Idleness is merely a sign that our productive resources are not properly apportioned among the various industries.

The second problem is to use the materials and energy that are available in the most effective manner possible—so as to get the greatest possible amount of want-satisfying goods per day, per week, per month, per annum in their use. While, with the limited amount of materials and energy at our command we cannot fully provide for every want of every person, nevertheless, we can and do make a greater or smaller provision for them according as we use these resources more or less effectively. Materials can be used economically or wasted. Energy can be applied effectively or ineffectively—it can be expended in doing only work that contributes to that purpose; that which is done, whether useful or useless, can be done in such a manner as to consume the minimum amount of energy or in such manner as to waste precious energy. Recently, the writer found in a certain shop that three-fourths of the work being done in a certain operation did not contribute to the desired result, that it was wasted effort.

Most wants recur in time. All production consumes time. Therefore, time must also be economized, but time also can be used effectively or ineffectively according to how well productive activities are planned and controlled. All productive activities, all storage, occupy space. And the space at our command is also limited and must be

economized. Space also can be effectively or ineffectively used according to how its use is planned and controlled. Organization, planning and control—the intelligence factor—are necessary for the effective use of available space, of available man and machine time as well as of available energy and materials.

Production managers are wont to speak of “productive” and “unproductive” labor. By “unproductive labor” they mean the sweepers, the instructors, the inspectors, the foremen, the clerks—workers whose work does not register itself directly in an advancement of the product toward its completion. But planning and directing and instructing and inspecting and sweeping are necessary to efficient production. Without them there would be less product or no product. To the extent that they are necessary they are just as productive as is the labor that “impinges directly on the product.” Better terms, as was long ago pointed out by the accountants, are “direct” and “indirect” labor. The only “unproductive” labor is labor that is ill-spent, labor that is wasted.

The problem of production, then, is to so organize, plan and control the application of the limited available energy to the limited available material in the limited available space, at our disposal, so correlated in time with reference to the occurrence of our wants, as to make the greatest possible provision for the satisfaction of those wants. And this application of energy to material in space and time—these productive processes—assembles materials into the right combinations, puts them into the right forms and sizes, moves them to the right places and makes them available at the right time to satisfy these wants.